

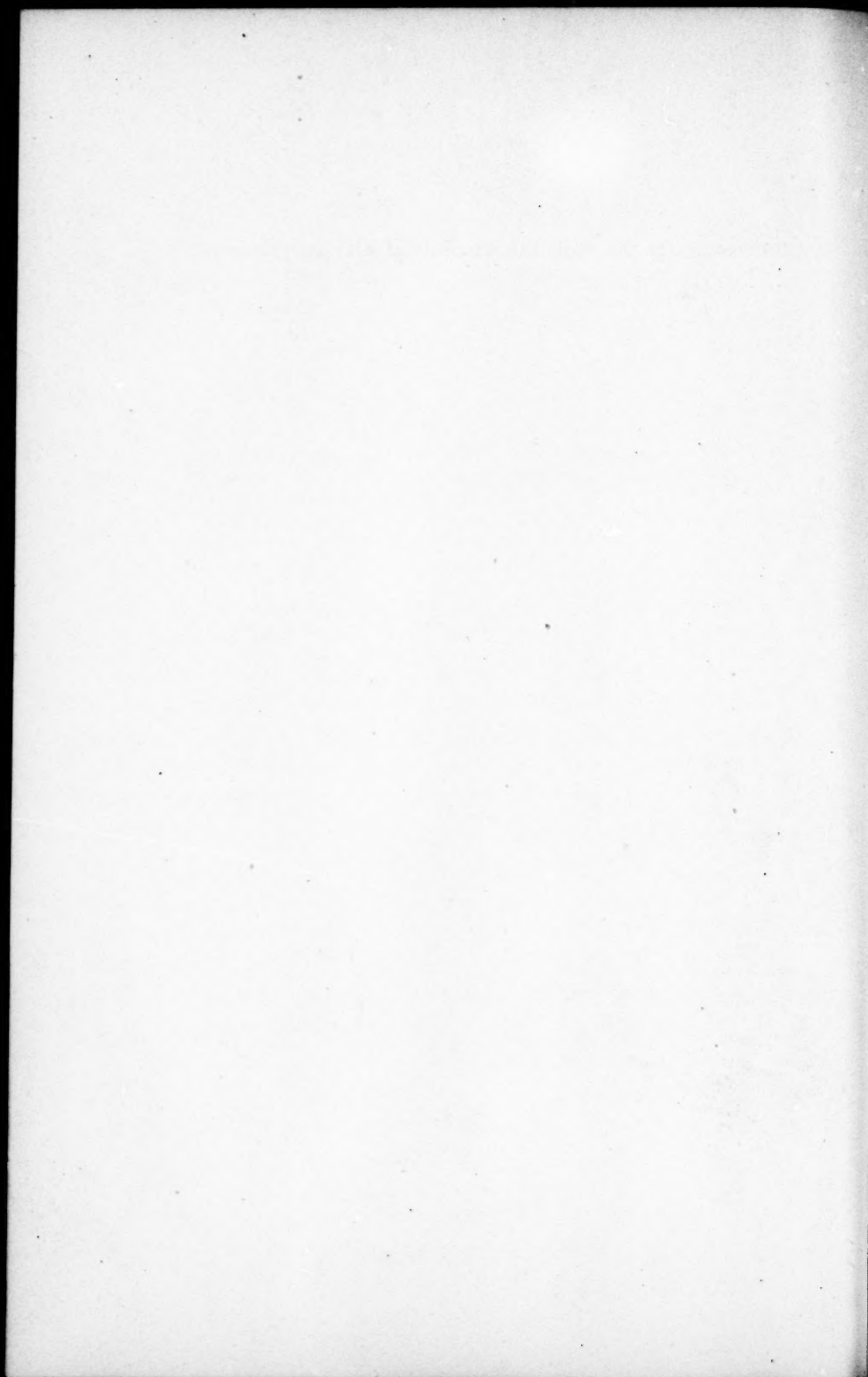
Proceedings of the American Academy of Arts and Sciences.

VOL. L. No. 2.—MAY, 1914.

**CONTRIBUTIONS FROM THE CRYPTOGAMIC LABORATORIES
OF HARVARD UNIVERSITY. No. LXXIII.**

LABOULBENIALES PARASITIC ON CHRYSOMELIDAE.

BY ROLAND THAXTER.



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Presented May 13, 1914.

Received April 1, 1914.

DURING the past eight years I have obtained from various sources a considerable number of Laboulbeniales parasitic on beetles belonging to family Chrysomelidae. The first which came under my notice was found on a species of *Lactica* near Buenos Aires, and was included in my recent paper on Argentine Laboulbeniales.¹ The forms considered in the present Contribution have been obtained on alcoholic material, from various regions in the Tropics, which I owe to the kindness of numerous correspondents; or have been collected by myself in Trinidad; while a considerable number are derived from the dry material in the collections of the Museum of Comparative Zoölogy at Cambridge. In this connection I desire to acknowledge my great indebtedness to Mr. W. M. Mann for the privilege of examining the insects collected by him in Brazil during the Leland Stanford University Expedition in 1911, to the Rev. Geo Schwab, Mr. C. S. Banks, the late Prof. Kellerman, and others, who have been so kind as to have collecting done for me: as well as to Mr. F. C. Bowditch for numerous determinations, and to Mr. Samuel Henshaw for freedom to examine the Museum collections and for other favors.

In June, 1912, a paper was published by Spegazzini on Argentine Laboulbeniales, in which several new species parasitic on this group of beetles are included. Of these one, a species very common on members of the genus *Lema*, is referred by him to *Sphaleromyces*: but since its structure corresponds in all respects to that of a typical *Laboulbenia*, it should undoubtedly be removed to this genus. The three remaining forms considered by this author, are placed by him in a new genus, *Laboulbeniella*, which is said to be distinguished from *Laboulbenia* by the fact that cells III and IV of the last mentioned genus are here replaced by a single cell, and that cell VI, the 'stalk-

¹ These Proceedings, 48 (1912).

cell' of the perithecium, is absent. Having had an opportunity to examine abundant material of these species, as well as of others belonging to the same type, I am unable to follow Spegazzini in making this separation; since in all cases I find that cell VI, as well as the usual basal cells of the perithecium, are present and variably developed, as in *Laboulbenia*; and the fusion of cells II-IV appears to be altogether too insignificant a character to form the basis of a new genus. It is true, however, that this replacement, or fusion, is characteristic of various forms parasitic on Chrysomelidae, and in most cases appears to have become a fixed condition. In other cases, however, the normal type is found and does not vary; while in still others both may be associated in the same species. I have called attention to the last mentioned condition in Part II of my monograph, and as will be seen by reference to fig. 11 of Pl. XIV, have figured a variety of *L. decipiens* in which, although the '*Laboulbeniella*' type predominates, the typical number and arrangement of the cells of the receptacle also occur. I have been disinclined, and I think rightly, to give generic value to variations in the cell numbers, especially of that portion of the receptacle in *Laboulbenia*, cells III-V and the insertion-cell, which corresponds to the base of the primary appendage in such genera as *Corethromyces*. Such departures from the normal type are seen in a majority of the aquatic species of *Laboulbenia*, in *L. proliferans*, *L. variabilis* and a number of the forms which occur on *Clivinae*, in all of which a multiplication of the cells in this region has been effected, instead of a reduction, as in the present instance. I have therefore placed in the genus *Laboulbenia* not only such of the chrysomelid forms as correspond exactly to the type, or in which the '*Laboulbeniella*'-condition occurs only occasionally, but also those in which cells III and IV are normally replaced by a single cell (designated as cell III + IV). Another type is also included, illustrated by the single species *L. partita*, in which, on certain hosts, the number of cells in the receptacle may become normally multiplied through the secondary division of the subbasal cell, a condition not previously observed except in abnormalities.

Although as will be seen a great majority of the chrysomelid parasites belong to *Laboulbenia*, two other genera are represented by well marked forms; *Dimeromyces* contributing four species from Mexico, the West Indies and the Straits Settlements; while seven species of *Cerauiomyces* are included, six of them parasitic on 'flea beetles' from the West Indies and Brazil, the seventh a very peculiar form from Kamerun and Madagascar.

Dimeromyces Homophoetae nov. sp.

Male individual amber-yellow. Receptacle consisting of three or four cells each of which may bear an antheridium: the primary appendage two celled, the basal cell shorter and broader, separated by a constriction from the distal which terminates in a long sharp spine and may often become one or more times septate, the terminal cell proliferating distally to form an antheridium which thus appears to be borne on a long several celled stalk on which the spine is lateral. Antheridia two to five, the stalk well developed, rather slender; the venter rather abruptly distinguished, though relatively narrow and slightly shorter than the nearly straight stout neck which tapers but slightly above its somewhat enlarged base. Total length to tip of appendage $60\ \mu$; to tip of antheridium $80\ \mu$, of proliferous antheridium $112\ \mu$; normal antheridium including stalk about $35-40 \times 6\ \mu$.

Female individual: receptacle suffused with amber-brown below, distally amber-yellow; consisting normally of four cells obliquely superposed, terminated by a two-celled primary appendage, the terminal cell of which is narrower than the basal and about as long; sometimes more or less inflated at its base, and ending in a long straight sharp spine: the basal cell becoming rather deeply suffused and extending upward against the base of the lower appendage which is somewhat broader than the sub-basal cell from which it springs, and slightly geniculate: the third cell giving rise to the normally single perithecium, the fourth to a second somewhat smaller appendage; the two appendages slender, simple, tapering, somewhat divergent on either side of the perithecium, which is subfusiform with no clearly defined stalk; the stalk-region hyaline, the rest of the perithecium amber-brown, the tip distinguished by two successive indentations below the hyaline three-lobed apex, the lateral lobes of which are symmetrical and smaller than the much more prominent median lobe. Spores $32 \times 3.5\ \mu$. Perithecium, including stalk-portion, $100-190 \times 20-35\ \mu$. Total length to tip of primary appendage $70\ \mu$; to tip of perithecium $140-250\ \mu$. Appendages, longest, $90-110\ \mu$.

On *Homophoeta aequinoctialis* Linn., No. 1577, Guatemala, on inferior prothorax; No. 2066, Grenada, W. I., on antennae, and No. 2475, Port of Spain, Trinidad, W. I. The specimens from Guatemala are somewhat larger than those from Grenada, but correspond in all other respects. The species appears to be more nearly allied to *D. Forficulae* than to any of the other described forms.

Dimeromyces Aulacophorae nov. sp.

Male individual: hyaline with purplish brown shades. Receptacle consisting of three to four very obliquely superposed cells terminated by a simple appendage, the basal cell of which is long and slightly inflated, bearing distally a three or four-celled terminal portion from which it is separated by a rather deep constriction associated with a conspicuous blackened septum. Antheridial branches one to three in number arising unilaterally, one from each cell of the receptacle; the stalk cell narrower below, suffused, rather long; the antheridium hyaline, its basal cells rather large and long; the body rather narrow, not symmetrically related to the rather broad long nearly isodiametric neck, the apex of which is nearly truncate. Receptacle $32 \times 10 \mu$ exclusive of foot; basal cell of appendage $16 \times 6 \mu$, the distal part $30-40 \times 4 \mu$. Antheridium including stalk $30-40 \times 5-6 \mu$, the stalk sometimes 11μ long.

Female individual: purplish or amber-brown. Receptacle consisting of usually six or seven obliquely superposed cells; flattened, except the terminal one which is separated from the basal cell of the terminal appendage by a horizontal septum; the subterminal cell producing the solitary perithecium; all the rest, except usually the small basal cell, giving rise to appendages which form a unilateral series: basal cells of the lateral appendages short, somewhat inflated and curved upward, bearing one to rarely four simple hyaline or slightly suffused straight or flexuous elongate branchlets, which for the most part taper but slightly and are distinguished at the base by a conspicuous broad blackened septum and constriction: the terminal appendage similar to that of the male, except that its basal cell often bears two branchlets distally. Perithecium relatively very large, hyaline or yellowish below, distally more or less suffused with purplish brown, straight or less often curved, slightly broader just above the short hardly distinguishable stalk, distally tapering rather rapidly to the rather broad apex which, in anterior view, is symmetrically three lobed, the middle lobe prominent and broader. Perithecium when well developed $175-250 \times 24-28 \mu$, sometimes smaller ($100 \times 18 \mu$). Spores $32 \times 3 \mu$. Receptacle about $65 \times 20 \mu$. Basal cell of primary appendage $20 \times 6.5 \mu$. Longer appendages $130 \times 3.5 \mu$.

On the elytra of *Aulacophora postica* Chap., Perak, Straits Settlements. M. C. Z., No. 2510.

The material of this species, although sufficiently abundant, is not

in very good condition, there being no perfect individuals. It is well distinguished by its enormous perithecia and by the development of secondary branches from the basal cells of the secondary appendages. It seems to be more nearly related to *D. Homophoetae* than to any other species, the conformation of the apex of the perithecium being somewhat similar, as well as the long-stalked antheridia, but it is otherwise very distinct.

***Dimeromyces Hermaeophagae* nov. sp.**

Male individual: nearly hyaline. Receptacle consisting of two superposed cells, the basal larger, laterally related to the foot; the subbasal giving rise to the single slender antheridium, the stalk-cell and basal cells of which form a relatively long stalk below the narrow only slightly enlarged venter, which is about as long as the rather stout outcurved neck. Primary appendage consisting of a basal cell nearly as long as the subbasal cell of the receptacle and bearing terminally a two-celled slightly inflated portion of about the same length, from which it is separated by a clearly defined dark septum. Total length to tip of appendage, 35 μ ; to tip of antheridium 50 μ . Antheridium-stalk (stalk- and basal cells) 16 μ ; venter and neck 18 μ ; appendage 17 μ .

Female individual: nearly hyaline or faintly yellowish. Perithecium arising from the third cell of the receptacle, its stalk-cell small, hardly distinguishable, its form rather elongate, tapering slightly, the tip distinguished by a very slight elevation; the spreading funnel-shaped apex distinguished by a constriction. Receptacle four-celled, the basal slightly larger, with inferior lateral small foot; the second and fourth bearing secondary appendages the basal cells of which are rather stout and long, and distinguished from the tapering several-celled terminal portion by a distinct dark septum which does not reach as far as the tip of the perithecium. Primary appendage like that of the male, stouter. Perithecium, exclusive of stalk-cell, 60–70 μ . Secondary appendages 60–70 μ . Primary appendage 20–25 μ . Total length to tip of perithecium 75–90 μ .

On antennae of *Hermaeophaga insularis* Jac., No. 2066, Grenada, B. W. I. (Brues).

This species seems most nearly allied to *D. minutissimus* and differs from all other known species in the peculiar funnel-shaped apex of the perithecium.

Dimeromyces Longitarsi nov. sp.

Male individual: hyaline or faintly yellowish; receptacle consisting of three obliquely superposed cells, the two upper bearing antheridia, and subequal, the basal as long as these two combined; the distal bearing terminally the unicellular appendage, which is twice as broad as the base of a hyaline usually straight subulate process that terminates it and nearly equals it in length. Antheridia normally two, the stalk-cell broader than long; the rather stout venter somewhat longer than broad, abruptly distinguished from the rather stout neck which is of about the same length and distally bent abruptly outward. Total length to tip of spinous process 60–64 μ ; to tip of distal antheridium 70 μ , the foot included. Appendage, including spinous process, 14–15 μ . Basal cell of receptacle 18 μ . Antheridia $22 \times 2 \mu$.

Female individual: tinged with yellowish, the perithecium deeper, faintly tinged with amber-brown, bent inward basally and distally, rather long and narrow, slightly broader distally below the paler tip, which is rather clearly distinguished above a slight constriction most prominent on the inner side; the apex distinguished by an often deep constriction, its base inflated to form rounded prominences above which it is compressed, asymmetrical, tapering to a blunt point: the stalk-cell small subtriangular, free only externally. Receptacle consisting of three obliquely superposed cells, the two upper subequal, angular, the basal longer; primary appendage as in the male, a minute cell distinguishable at the base of the spinous process: secondary appendage single, its basal cell similar to the subbasal cell of the receptacle from which it arises and with which it is obliquely associated; the rest of the appendage simple, slender, whip-like, tapering; seldom extending beyond the tip of the perithecium. Perithecium $80\text{--}120 \times 20\text{--}25 \mu$. Secondary appendage $85\text{--}100 \mu$: primary appendage, including spine, 25 μ .

On the elytra of *Longitarsus testaceus* Mels., Fayetteville, Arkansas No. 1801; of *L. subcinctus* Har., No. 2455 and of *Aphthona Deyrollei* Baly, No. 2454, Port of Spain, Trinidad, B. W. I.

This species is most nearly related to *D. Homophotae* from which it is distinguished by its unicellular primary appendage and single secondary appendage, as well as by various other points of difference. The material from Arkansas appears to differ in no respect from that obtained in Trinidad.

Laboulbenia Bruchii (Speg.).

Sphaleromyces Bruchii Speg., Cont. al Est. d. l. Laboulbeniomycetas Argentinas; Ann. d. Mus. Nat. d. Hist. Nat. de Buenos Aires, XXIII, p. 195, with figure, 1912.

This form, which is very common on various species of *Lema* in Tropical America, has been referred to *Sphaleromyces* by Spegazzini. Its structure, however, is that of a typical *Laboulbenia*, and the number and arrangement of the cells of its receptacle are both normal. Although the structure is sufficiently clear in younger individuals, cells II and III usually become very deeply suffused, except along their inner edges, and are indistinguishable from cell IV, the variable prolongation of which forms the curious spur-like termination regarded by Spegazzini as a development from cell II, and as similar to that which arises from the distal cell of the two-celled receptacle of *Corethromyces*, in which it is a development from this cell only. This characteristic varies very greatly in different individuals of the present species, the spur in many cases being but slightly developed, or at least far less prominent than it is in the typical form represented by the figures of Spegazzini. The species is a very striking and variable one, closely allied to the three following forms which occur on the same host genus, and in the characteristic development of cell IV resembles *L. producta* of my second Monograph (Plate LXIV, fig. 13). The longitudinal dehiscence of the perithecium, which is given by Spegazzini as a distinguishing character of this species, must be regarded as an accidental splitting, which is not infrequently seen in dried material that has been taken from museum specimens and suddenly swelled by mounting.

Material has been examined from the following sources. No. 1643, on *Lema* sp. Guatemala, (Kellerman); No. 1774, on *L. Sallei* Jac. Mexico (Biologia Coll.); No. 1775, on *L. Albini* Lac., Mexico (Biologia Coll.); No. 1776, on *L. dimidiaticornis* var., Mexico, (Biologia Coll.); No. 2212, on *L. gracilis* Jac., Para, Brazil (Mann): Nos. 2476-2477, on several species of *Lema*, Port of Spain, Trinidad.

Laboulbenia Papuaë nov. sp.

Receptacle short and subtriangular, the basal cell nearly hyaline, except distally and along its posterior margin; short, abruptly broader distally, subgeniculate; its base clasped by a bluntly pointed

upgrowth from the foot on either side, which is black, contrasting and slightly oblique: cell II much smaller, flattened, dirty olivaceous, extending upward anteriorly and separated by a slightly oblique partition from cell VI; which is smaller, concolorous and separated by a strongly oblique septum from the basal cells of the perithecium, which are relatively large, clearly defined and paler dirty yellowish: cells III-V forming a clearly distinguished, somewhat darker translucent grey olive-colored region, the inner walls of which are nearly vertical, but curve abruptly outward where they are in contact with cell II: cell III larger than cell II, but somewhat similar in shape, except for its curved base, separated from cell IV by a strongly oblique curved septum; cell IV nearly as large as cells II and III combined, externally concave, projecting beyond the insertion-cell to form a broad rounded prominence distally slightly compressed; cell V well defined, triangular, externally convex. Insertion-cell clearly defined, translucent. Basal cell of outer appendage about as long as broad, distally much broader, and bearing a terminal series of three radially arranged branches, themselves once branched above their basal cells; the outer curved outward and externally more deeply suffused with blackish brown externally at the base; the branchlets curved more or less strongly inward, distally hyaline, with olive brown suffusions below, seldom reaching to the tip of the perithecium. Perithecium relatively long, curved slightly outward, wholly free above its basal cells; the inner half rich brown, sometimes contrasting with the often much paler dirty yellowish brown outer half, which is concolorous with the long compressed slightly darker, not abruptly distinguished tip, the concave outer margin of which is abruptly much darker; the lips small but well defined. Perithecia $100-125 \times 25-28 \mu$. Appendages, longest 110μ . Receptacle including protrusion $85-100 \times 50-60 \mu$, exclusive of foot. Total length, including foot, $200-228 \mu$.

On the elytra of *Lema* sp., New Guinea, M. C. Z. No. 2511.

This species is so closely related to *L. Bruchii* that I have hesitated to separate it specifically, and it may prove to be merely a well marked variety when a large series becomes available for examination. The type material includes a half dozen specimens in good condition, all of which show the characteristics above described.

***Laboulbenia rhinoceralis* nov. sp.**

Receptacle short and stout, subtriangular, the basal cell larger than the subbasal, longer than broad, hyaline becoming tinged with

olivaceous; cells II and III subequal; cell IV forming a short blunt prolongation external to and beyond the insertion-cell; cells II-IV becoming almost or quite opaque and indistinguishable, except along their inner margins; cell V relatively large and rounded, suffused with olivaceous brown, as is cell VI, which lies obliquely below it, is of about the same size, and is separated by a deep indentation from the outer lower basal cell of the perithecium immediately above it, which is quite hyaline, bulging asymmetrically outward and separated from the cell above it by a deep indentation. Insertion-cell rather thick, black; lying horizontally in the deep depression formed between the base of the perithecium and the projecting termination of cell IV. Outer appendage deeply suffused at the base and externally, curved outward, consisting of usually two larger basal and subbasal cells; the former giving rise to a subterminal inner branch, and the latter to a subterminal inner and two or three terminal short branches, the outer black and abortive; the basal cell of the inner appendage nearly as large as that of the outer, bearing a branch on either side which is very similar to the outer appendage and externally suffused; all the branches rather short and stout, more or less suffused about the base. Perithecium wholly free, the upper basal cells forming a very short stalk, relatively large, long and narrow; the venter hardly inflated, opaque or nearly so; the tip translucent, not distinguished from the venter, except by a clean cut transverse line of demarcation; the hyaline apex subtended externally by two superposed long hyaline slightly outcurved horn-like appendages, the lower an extension of a laterally misplaced lip-cell, the upper a subterminal projection from the outer of the three remaining lip-cells which surround the sulcate pore; the latter turned slightly inward. Perithecia $90-120 \times 20-25 \mu$, its horn-like appendages about $18 \times 6 \mu$. Spores $35 \times 3.5 \mu$ (measured in perithecium). Receptacle average $52 \times 28 \mu$. Appendages longer 52μ . Total length to tip of perithecium $125-175 \mu$.

On the elytra of *Lema gracilis* Jac., No. 2212, Para, Brazil (Mann), on *Lema* sp., Port of Spain, Trinidad, No. 2477; on *Lema* sp., Suriname, No. 2480 (Rorer).

A very peculiar species distinguished from its near ally, *L. Bruchii*, by the peculiar horn-like processes which subtend the apex. The lower of these processes is formed by the abnormal termination or the left posterior series of wall-cells which, instead of forming a lip-cell, bends abruptly outward as it traverses the tip, crossing the series external to it and projecting as a free appendage. The two horns are sometimes malformed and somewhat misplaced, but are usually well developed and symmetrically placed one above the other;

the whole tip thus armed strongly suggesting the head of a two-horned rhinoceros. The species was common in the vicinity of Port of Spain, but individuals were found only in the depressions near the bases of the elytra. The receptacle is twisted one quarter in relation to the perithecium, in most specimens; so that, when the latter lies flat, the receptacle is usually viewed edgewise.

Laboulbenia Hottentottae nov. sp.

Receptacle rather slender, sometimes slightly geniculate between cells II and III; cell I usually quite hyaline; cells II-III becoming more or less deeply suffused, or nearly opaque; cell II sometimes abruptly broader than cell I, but always shorter; separated from cell VI by a horizontal, from cell III by a very oblique partition; cells III and IV subequal, separated by a very oblique partition; cell V narrow, triangular, nearly hyaline; cell VI suffused, distinguished above and below by an indentation, obliquely separated from the cells above, which form a broad almost stalk-like base to the perithecium. Insertion-cell suffused, but not blackened, rather thick. Basal cell of outer appendage somewhat longer than broad, brown, giving rise to a short hyaline erect subterminal branch on the inner side; the sub-basal cell colored like the basal, somewhat longer; the rest of the appendage hyaline, few-celled, short; basal cell of the inner appendage much smaller than that of the outer, concolorous; producing a branch on either side, each usually once branched; the branches sometimes exceeding the perithecium in length, hyaline, except the brownish basal cells. Perithecium wholly free, rather long and slender, often nearly symmetrically inflated, deep rich brown, tapering evenly distally; the tip hardly if at all distinguished, darker along the inner side; the apex blunt, the lip-edges subhyaline about the pore, sometimes slightly oblique outward; a slight projection usually visible next the pore. Perithecia, exclusive of basal cells, $90-125 \times 18-25 \mu$. Receptacle $90-110 \times 25-32 \mu$. Appendages, longest 120μ . Total length to tip of perithecium $160-200 \mu$.

On elytra etc. of *Lema Hottentotta* Lac., Zanzibar (M. C. Z.): crowded near tips of elytra.

This species usually has a somewhat falcate or slightly curved habit, and is rather slender in form. Although apparently allied to *L. Bruchii*, its appendages and receptacle separate it at once from any of the forms of that species. The material available is abundant and in good condition.

Laboulbenia Braziliensis nov. sp.

Receptacle often straight and narrowly wedge-shaped, sometimes slightly curved and less regular, but tapering more or less regularly from summit to base; hyaline, becoming yellowish or tinged with brown, deeply along the posterior margin especially immediately below the insertion-cell; cell III longer than cell IV which is abruptly prominent below the insertion-cell, sometimes forming a rounded projection beyond it: cell V relatively large, sometimes as large as cell IV, and in contact with cell III: cell VI relatively very large, exceeding cell III in length. Insertion-cell thick and rather narrow; basal cell of the outer appendage rather small somewhat rounded, tinged with brown externally, separated by an oblique blackened septum from a distal and external furcate branch, within which one or more additional erect branches arise, not thus separated; basal cell of the inner appendage much smaller, also pale brownish, giving rise to branches on either side which are usually once branched, and, like those of the outer, are rather stout hyaline or faintly brownish, erect, slightly tapering, seldom reaching beyond the tip of the perithecium. Perithecium deep rich brown becoming opaque or nearly so, wholly free; the base of the venter somewhat narrower than the basal cell-region below it, the outer margin nearly straight, the inner convex; the tip bent outward, not distinguished except on the inner side, the apex symmetrically rounded or almost truncate; the lip-edges broadly hyaline, contrasting. Perithecia $130-158 \times 40-48 \mu$. Receptacle, average, $175 \times 52 \mu$. Appendages, longest, 160μ . Total length to tip of perithecium $350-380 \mu$.

On a chrysomelid allied to ?*Oedionychus*. Rio de Janeiro, Brazil, M. C. Z. 'Mrs. Munro,' No. 1786, on the legs and elytra.

This species seems to be very well distinguished from any of the other species on Chrysomelidae. The host is a stout chrysomelid, the elytra dark bluish black, with a red margin all around. More than twenty mature individuals and numerous younger specimens have been examined, in which the measurements seem unusually constant and the variations in other respects slight, except that in some specimens cell IV protrudes in a fashion which recalls less well developed individuals of *L. Bruchii*.

Laboulbenia idiostoma nov. sp.

Receptacle evenly suffused with olive-brown, somewhat darker distally, short and compact, relatively small; cell I slightly larger than cell II and nearly triangular, or symmetrically pointed distally between cells III and VI; cells III and IV subequal, the latter forming a rounded prominence distally, which turns the insertion-cell so that it is very oblique, or even vertical, in position, the appendages being thus turned so that they cross the base of the perithecium obliquely, or at right angles; cell VI rounded and prominent, the basal cells of the perithecium also small and bulging, especially externally. Perithecium relatively large, long, straight or but slightly curved, often somewhat broader distally, rich purplish brown, almost opaque, free; the tip abruptly attenuated, indented externally, and hyaline distally, the apex prominently bilobed, the lobes rounded and symmetrical when viewed anteriorly or posteriorly. Appendages relatively long, straight or symmetrically curved; the outer appendage simple, its basal cell large, externally convex, its distal septum broad and blackened; the basal cell of the inner appendage half as large; a group of antheridial and sterile branchlets arising on either side, which may be branched near the base so as to form a tuft in which about six of the branchlets are apt to be sterile and project across the base of the perithecium; all the sterile branchlets subcylindrical, rigid, rather remotely septate, sometimes furcate near the blunt tip; the antheridia relatively large and long, with a narrower base below the rounded venter, usually in pairs, and sometimes on long branchlets. Perithecia, average, $122 \times 30-35 \mu$. Receptacle $70-85 \times 35-42 \mu$. Appendages, longest, 200μ . Total length to tip of perithecium, average 175μ .

On antennae of *Haltica Jamaicensis* Fab. Ennery, Hayti (Mann), No. 2491.

A very distinct species observed only on the antennae of its host. The peculiar tip of its perithecium is not unlike that of *L. leptostoma* Speg.

Laboulbenia fuliginosa nov. sp.

Receptacle and appendages dirty yellow olive-brown; the former of normal form and structure, more deeply suffused with age; cells IV and V often subequal; cell III slightly larger than cell VI; cells I and II of nearly equal length; the whole tapering more or less regularly to

the base. Insertion-cell broad and thick; basal cell of the outer appendage externally more deeply suffused and slightly convex, separated by an oblique blackened septum from its outer branch which is short, submoniliform, and usually four-celled; a second branch arises within the outer, its basal cell about equal to that of the outer, but bearing two branchlets, radially placed; consisting of four or five short cells like those of the outer branch, extending usually not more than two thirds the length of the perithecium, towards which, like the outer, they are usually slightly bent; basal cell of the inner appendage slightly smaller than that of the outer, bearing a branch on either side consisting of a single cell terminated usually by a pair of antheridia, which may also be associated with one or two short stout branchlets like the outer. Perithecium free, except its basal cells, becoming quite opaque; convex on both sides, more abruptly so externally; tapering distally to the rather narrow tip; the apex sometimes slightly apiculate; the lip-edges hyaline, or translucent. Perithecia (above basal cells) $100-125 \times 40-48 \mu$. Spores about $55 \times 5.5 \mu$. Receptacle $150-200 \times 45-52 \mu$. Longest appendages 90μ (usually broken). Total length to tip of perithecium $60-90 \mu$.

On the elytra and under surface of *Haltica plebeia* Oliv. No. 1785, Hayti (M. C. Z.); on *Haltica* sp. Cuba, (M. C. Z.), No. 1784; and 1787; No. 1770, on *Haltica amethystina* Oliv., Vera Paz, Biologia Coll. on *H. Jamaicensis* Fab., No. 2491. Ennery, Hayti (Mann); No. 2506, Jamaica.

This is a very ordinary looking species, of more or less uniform dark, dirty olive-brown color, apparently very common on its hosts in Hayti and Cuba. It is perhaps as nearly allied to *L. partita* as to any of the other species on Chrysomelidae, but never appears to deviate in structure from the ordinary type of the genus. The material is usually poor, even on hosts preserved in alcohol, and the outer branch of the appendage is seldom found in adults.

Laboulbeni Halticae nov. sp.

Dull olivaceous, the perithecium and distal portion of the receptacle somewhat darker. Receptacle normal, or occasionally cells III and IV replaced by a single cell, slender, but little broader distally; cells I and II subequal, or I slightly longer; cells III and IV subequal; cell V reaching down to, or nearly to, cell III and sometimes equalling it in size. Insertion-cell thick, deeply suffused, but not opaque:

basal cell of outer appendage large, longer than broad; its subbasal cell slightly smaller, and normally bearing two long branchlets, both simple, or the outer once branched: basal cell of the inner appendage very small, bearing a branch on either side which may be simple or once branched and bearing scanty antheridia; all the branchlets becoming tinged with olivaceous, especially at the base and externally, the longest sometimes twice as long as the perithecium or even longer. Perithecium four fifths or more free, rather narrow, the venter but slightly inflated; the tip hardly distinguished, broad; the apex broad, rounded or subtruncate, externally unevenly oblique, hyaline about the pore, beside which one of the lip-cells usually forms a distinct, though minute prominence. Perithecium $70-90 \times 25-30 \mu$. Receptacle $85-125 \times 25-30 \mu$. Appendages, longest, 150μ ; in one young specimen 227μ . Total length to tip of perithecium $125-210 \mu$, average 175μ .

On *Haltica* sp. Kamerun (Schwab), No. 2449 (type): on *Systema Deyrollei* Boh., Port of Spain, Trinidad, No. 2467.

The specimens from Kamerun and Trinidad do not appear to differ essentially. The species is not distinguished by striking peculiarities, but does not seem referable to any described form. The material is abundant and in good condition. A small percentage of the specimens from Kamerun are of the '*Laboulbeniella*' type, cells III and IV being replaced by a single cell. This does not seem to be the case, however, in the material from Trinidad.

***Laboulbenia Nodostomae* nov. sp.**

Short and stout. Cell I slightly longer than cell II which is slightly longer than broad, its anterior margin strongly convex; cell III broader than long, shorter than cell IV; cell V small triangular, cell VI somewhat smaller than cell II; cells II-V dirty yellow, deeply tinged with brown, the rest dirty yellow; the walls, only, tinged with brown. Insertion-cell broad thick and blackish; appendages almost or quite hyaline. Basal cell of the outer appendage somewhat longer than broad; bearing distally two simple branches, obliquely related, the outer stout tapering, elongate and incurved; basal cell of the inner appendage about half as large as that of the outer, producing a single simple short stout branch on either side, each with one or two antheridia at the base. Perithecium a little less than one third free, rather short and stout, dark blackish olive, paler below, and subterminally;

the tip deep black, short, broad, abruptly distinguished; the lip-edges broadly hyaline, contrasting; the apex more or less rounded, two indistinct papillae above the external pore. Perithecia $60-65 \times 25 \mu$. Spores as long as venter, about $40 \times 4 \mu$. Receptacle $80 \times 35 \mu$. Appendages, longest 175μ . Total length to tip of perithecium 130μ .

On tip of the elytron of *Nodostoma* sp., Mindanao, Philippines, No. 2386, received through the kindness of Mr. Oakes Ames.

An insignificant species very similar to some of the forms on Carabidae allied to *L. flagellata*.

Laboulbenia Philippina nov. sp.

Receptacle varying in length from the variable elongation of cell II; hyaline, becoming tinged with straw-yellow; cells I and II relatively large, of about the same diameter, cell II often far longer; cells III, IV and VI subequal and subisodiametric; cell V very small, triangular. Basal cells of the perithecium hyaline, well defined, contrasting with the venter; that lying externally above cell VI usually prominent; venter rich contrasting translucent purplish brown; slightly, often symmetrically, inflated; the tip more or less well defined, rather abruptly so externally where a narrow margin is deeply suffused; otherwise quite hyaline, except for a black patch which subtends the rather prominently rounded inner lip-cell; the lip-edges hyaline, outwardly oblique. Appendages wholly hyaline, becoming yellowish; the basal cell of the outer appendage giving rise to an outer and an inner branch; the basal cell of the inner appendage much smaller, producing a usually simple branch on either side; all the branches rather stout, elongate, somewhat divergent or even slightly recurved, slightly tapering. Insertion-cell contrasting with all the cells about it. Perithecium about five sixths free, $85-100 \times 28-35 \mu$. Spores $50 \times 3.5 \mu$. Receptacle $100-225 \times 38-42 \mu$. Appendages longest $210-420 \mu$. Total length to tip of perithecium $150-335 \mu$.

On the elytra and legs of a chrysomelid near *Rhembastus*: No. 2451 Manila, Philippines (Banks).

Very like some forms of *L. polyphaga*, and distinguished from related forms on Chrysomelidae by its often elongate form, hyaline or evenly pale yellow color, its stout elongate concolorous appendages and deeply suffused contrasting perithecium.

Laboulbenia Oedionychi nov. sp.

Receptacle normal, hyaline, becoming faintly tinged with olivaceous, especially distally where it is indistinctly punctate; cells I and II subequal, relatively large, the remaining cells small; cell III slightly larger than cell IV; the outer margin of the latter curved evenly outward and downward from the insertion-cell; cell V triangular, small, not in contact with cell IV. Insertion-cell black contrasting, rather thick, not very broad. Outer appendage almost invariably simple, slender, divergent, horizontal or recurved, long, slender and slightly tapering, often geniculate at the base in the region of the subbasal cell; which, like the basal, is more or less tinged with blackish olive externally, and is often prominent distally on the inner side: basal cell of the inner appendage somewhat smaller than that of the outer, producing a short, usually simple, branch on either side, each bearing a single antheridium near the base. Perithecium united to cells IV and V at its base, transparent olivaceous, usually straight; the venter long, narrow, slightly and evenly inflated; the tip slightly distinguished, very slightly bent outward, broad, more deeply blackened below the hyaline lip-edges; the rather coarse lips outwardly oblique. Perithecia $80-85 \times 20-24 \mu$. Spores $48 \times 4 \mu$. Receptacle $90-140 \times 28 \mu$. Appendage, longest, outer $175-230 \mu$, the inner, $35-80 \mu$. Total length to tip of perithecium $140-210 \mu$.

On the elytra of *Oedionychus* nov. sp., No. 2415 and 2450, Manila, Philippines (Banks).

Abundant material of this species in perfect condition has been examined. The species like *L. Halticae* to which it is allied, is not unlike some of the many forms allied to *L. polyphaga* and *L. flagellata* which occur on Carabidae. Specimens from the legs (No. 2450) of the same host are somewhat smaller, the outer appendage more deeply blackened externally, both the basal and subbasal cells bearing distally on the inner side an erect hyaline branch; the receptacle short, cell I longer than cell II; the perithecium more deeply suffused.

Laboulbenia Hermaeophagae nov. sp.

Receptacle normal, faintly punctate, olivaceous, darker distally; the basal cell paler or hyaline below, narrow, somewhat longer than the subbasal; cells III and VI subequal, the latter strongly convex externally; cell IV prominent below the insertion-cell; cell V rounded

or irregularly quadrangular, its base resting on cell II; all the cells distinguished from one another by more or less distinct indentations, owing to the convexity of their margins which may be pronounced. Insertion-cell thick and deeply suffused. Outer appendage consisting of a divergent series of three cells, successively smaller and externally more deeply suffused with blackish olive, the terminal one bearing distally a pair of short branchlets radially placed; the basal and subbasal each bearing a stout subterminal simple branch on the inner side; basal cell of the inner appendage much smaller, bearing a branch on either side which may be once branched; all the branchlets rather short and stout, never reaching to the tip of the perithecium. Perithecium wholly free, almost subfusiform, the small but prominent basal cells forming an indistinct stalk, often hyaline and contrasting with the deep olive brown venter above; which is evenly inflated, more strongly convex externally, but sometimes almost symmetrical, tapering slightly to the truncate apex which is surmounted by a pair of minute prominences. Perithecia, average, $80 \times 25 \mu$. Spores $50 \times 5 \mu$. Receptacle $70-80 \times 30 \mu$. Appendages longest 70μ . Total length to tip of perithecium $150-175 \mu$.

On tips of elytra of *Hermacophaga* sp., No. 2466, Port of Spain, Trinidad.

Several specimens of a species very similar to this, were obtained on a species of *Hermacophaga* from Jamaica. The cells of the receptacle in this form bulge more prominently than in the type, but there is otherwise slight difference between the two. The perithecium appears to be more often twisted about one fourth, so that the appearance of the apex as above described is that of an anterior or posterior view.

***Laboulbenia Manobiae* nov. sp.**

Receptacle uniformly hyaline tinged with yellow, normal in structure; cells I and II subequal relatively large, somewhat more than twice as long as broad; cells III, IV and VI subequal and subisodiametric, the latter, as well as the large external basal cell just above it, bulging prominently. Insertion-cell broad, rather thin and black. Basal cell of outer appendage somewhat longer than broad, externally somewhat suffused, bearing a stout simple branch subterminally which projects outward; its basal cell, except distally, deeply suffused, the remaining cells nearly or quite hyaline; a second similar but wholly hyaline branch arising terminally: basal cell of the inner

appendage somewhat smaller, bearing one or two hyaline branches similar to those of the outer; on either side the external one is subtended by a short stiff characteristically blackened branchlet: all the branches stout, hyaline, elongate, tapering but slightly. Perithecium nearly free, rich blackish brown, the suffusion involving part of its basal cells; rather symmetrically inflated, a contrasting paler region just below the well distinguished rather broad deeply suffused tip; the lips rather coarse and prominent, the two inner lips bearing distally a well defined papilla. Perithecium $75 \times 25 \mu$. Appendages about 140μ . Receptacle $70-80 \times 28 \mu$. Total length to tip of perithecium 145μ .

On the tips of the elytra of *Manobia abdominalis* Jac., M. C. Z., No. 2505.

Although this species represents a somewhat ordinary type of the genus, it differs from others that are known, through the presence of a short black subulate branchlet which subtends the stout external branch of the inner appendage on either side. The branches of the appendage are unusually stout, almost hyaline, and diverge almost horizontally in the two types, which are in good condition.

***Laboulbenia partita* nov. sp.**

Receptacle very variably developed; elongate, or short and stout, the structure normal, or often abnormal through the secondary division of cell II, which may be replaced by a series of from two to rarely ten or often nine superposed cells, many of which may be distinguished, singly or in pairs, by slight constrictions; the series of about the same diameter throughout, except the terminal cell which may rarely be once or twice longitudinally divided; the distal portion of the receptacle, cells III-VI, usually normal, rarely of the "*Laboulbeniella*-type," the whole hyaline and abruptly contrasting with the dark perithecium, of more or less suffused, with yellowish brown, especially at the margins of cells III-IV; cells III and VI usually subequal, cell IV protruding below the black, well defined insertion-cell. Appendages variable, the basal cell of the outer slightly longer than broad, somewhat inflated and externally suffused, bearing distally one to three branches, usually two, radially placed the basal cell of the outer often suffused externally, bearing distally usually two or three short simple branchlets radially placed, blunt and hyaline; basal cell of the inner appendage much smaller than the outer, bearing a branch on

either side which may be multiplied by successive branching so as to form a rather dense tuft, none of the branchlets extending beyond the tip of the perithecium. Perithecium free, erect, straight, deep slightly olivaceous brown above its contrasting basal cells, the tip bent slightly outward; lip-cells hyaline, tipped by two minute papillae. Spores about $40 \times 3.5 \mu$. Perithecia, suffused part, average $75-85 \times 32 \mu$. Appendages, longest, 85μ . Receptacle, average, $135 \times 25 \mu$, ($85-175 \mu$). Total length to tip of perithecium $140-250 \mu$.

On *Nisotra dilecta* Dej. and *Nisotra* sp. Kamerun, German W. Africa, (Schwab) usually on elytra: On *N. Chapuisi* Jac., Madagascar, M. C. Z., No. 2504.

The abnormal septation of cell II is more common than the normal type on *N. dilecta* while on the second species, a uniformly steel blue form, it is comparatively rare. Specimens in which the septation is pronounced might well be mistaken for a species of *Misgomyces*. Specimens also occur having the simplified structure of "*Laboulbeniella*" as separated by Spegazzini. The material from Madagascar includes only the normal type and the individuals are smaller and less well developed.

***Laboulbenia Dysonichae* (Speg.).**

Laboulbeniella Disonychae Speg., Contr. al Est. d. l. Lab. Argent. p. 188. 1912.

This species has been made the type of a new genus *Laboulbeniella* by Spegazzini, which he based on the fact that cells II and IV are replaced by a single cell. As I have already pointed out above, this character seems to me too trivial to form the basis of a new genus, for the reasons mentioned. It appears, however, to be the normal condition in many of the chrysomelid forms and is found in all the following species, as well as occasionally in several of those above described, as for example in *L. Halticae*. *L. Tucumanensis* described by Spegazzini on a similar host, which is said to possess stouter perithecia, does not appear to differ in any essential respect from the present form, as far as can be determined from the figures and description of the author.

Material of this species has been examined from Mexico, Biologia Coll., No. 1768 on *Disonycha figurata* Jac., and was obtained by myself in Trinidad on *D. austriaca* Schf., Nos. 2474, 2474b and 2474B, from the vicinity of Port of Spain and from Sangre Grande. It is

distinguished by its very slender and long appendages, which, although they are only about $4\ \mu$ in diameter, may reach a length of more than $300\ \mu$. In the specimens examined, the diameter of the perithecium varies from $21\text{--}35\ \mu$.

In the following descriptions all of which, except that of *L. Podontiae*, relate to forms of the "*Laboulbeniella*"-type, the cell which replaces cells III and IV in the receptacle is spoken of as "cell III + IV."

***Laboulbenia arietina* nov. sp.**

Receptacle relatively small, much shorter than the perithecium; olive brown, except the basal cell which is pale and slightly larger than the subbasal; cell III + IV about as long as cell II and half as wide; cell V minute; cell VI well developed, obliquely placed. Insertion-cell olivaceous, small, not deeply blackened. Appendages similar to those of *L. Disonychae*, the small bases of the outer and inner, opaque, prominent and persistent; giving rise to slender branches two or three times successively branched, olivaceous, their lower septa dark, bent rather abruptly toward and across the base of the perithecium and more or less circinate about it. Perithecium wholly free, relatively long and large, bent toward the appendages, dark brown, the base and tip paler olivaceous; the tip not otherwise distinguished; the apex oblique and prominent, externally oblique; one of the inner lip cells extending upward to form an erect blunt hyaline tipped appendage, its base concolorous with the dark olivaceous apex. Perithecia $100\text{--}140 \times 20\text{--}25\ \mu$; the terminal appendage $18\text{--}25\ \mu$. Receptacle $60\text{--}100 \times 24\text{--}28\ \mu$. Appendages longest about $150\text{--}175\ \mu$. Total length to tip of perithecium $160\text{--}240\ \mu$.

On the elytra of *Disonycha recticollis* Jac., No. 1843, Guatemala, Kellerman; and of *D. austriaca* Schf., No. 2474b, Port of Spain, Trinidad.

The four individuals of this peculiar species which have been examined correspond in all respects; the Mexican being only slightly larger than the Trinidad specimens. It is very closely allied to *L. Disonychae* with which it occurred, but is at once distinguished by the terminal appendage of its perithecium.

***Laboulbenia Podontiae* nov. sp.**

Receptacle usually small and short, but variable; dull dark brown, the basal cell conspicuously paler dirty yellowish or yellowish brown,

relatively large, sometimes nearly as long as the rest of the receptacle; cells II and VI subequal in length; cell II usually broader; cells III and IV often about equal their septa oblique, their external margins convex; cell V small, extending to cell III; cell VI and the basal cell above it, externally convex. Insertion-cell free, rather thick, black, pointed above. Basal cell of the outer appendage rather deeply suffused with olive-brown, somewhat long and narrow; bearing distally, or distally and externally, a series of two or three branches, similar, radially arranged with blackened basal septa; their basal cells broader distally, short and stout and bearing one to three secondary branches in a similar fashion, this branching being variably repeated; the cells of these branches and branchlets similar, hyaline, with distal external suffusions; the ultimate branchlets few-celled, hyaline, curved toward the tip of the perithecium which they barely reach; all the septa of the partly suffused cells deeply blackened: basal cell of the inner appendage about half as large, becoming pushed somewhat sidewise and bearing distally a series of two or three branches radially arranged, or slightly oblique, which are similar to those of the outer appendage. Perithecium arising opposite the inner upper angle of cell III; concolorous with the receptacle, or more olivaceous; usually rather strongly curved, and tapering from near the base to the rounded apex; which is usually narrow, but hardly differentiated mostly long and slender, slightly enlarged at the apex, the lip edges not prominent, the inner hyaline: the wall-cells indicated by dark lines, the longitudinal ones having a spiral tendency sometimes lacking, so that the apex may be seen in anterior or posterior view and appear broad and subtruncate. Perithecia $70-100 \times 18-20 \mu$. Spores very slender, the distal half about as long as the basal, attenuated to a fine point bent abruptly sidewise, about $55 \times 3 \mu$. Receptacle $70 \times 24-28 \mu$; larger form $100 \times 28 \mu$. Appendages about 70μ . Total length to tip of perithecium about $140-160 \mu$; the larger type sometimes 230μ .

On the elytra of *Podontia lutea* Oliv., No. 2507, Hong Kong; No. 2508 on *P. 14-punctata* Linn., Himalayas, both in M. C. Z.

Although the material of this species is abundant, no specimens are in perfect condition, the appendages apparently breaking very readily. It varies very greatly in size and form, many pigmy individuals occurring near the middle and base of the elytra, in depressions of their surface. In these small stout forms the receptacle is compacted and reduced, cell I forming a short hyaline stalk; cells III and IV prominent at the side; while the rest are hardly distinguishable from the base of the stout, small perithecium. The material from *P. 14-punc-*

tata is in part similar to that from *P. lutea*, but one specimen of the latter species bears a distinctly larger, rather slender, straight form, in which the twist of the wall cells of the straight perithecium is more distinct; so that its tip is nearly always seen at right angles to the normal position, and appears broad and flattened and quite unlike the more typical form, which occurs on other specimens of the same species. The form is most nearly related to *L. orientalis*, the fundamental characters of its appendages being very similar. The latter may prove to be longer than above indicated when perfect specimens become available for examination.

Laboulbenia Diabroticae nov. sp.

Perithecium relatively large, its basal cells and basal wall-cells concolorous with the receptacle, dirty yellowish, the rest rich translucent brown, except the hyaline outer half of the apex, the right anterior lip-cell forming distally and externally a more or less distinct truncate projection, its fellow usually shorter and rounded. Receptacle variable, stout, sometimes short, sometimes elongate through the elongation of cells I and II; cell III + IV relatively small, bulging somewhat externally; cell VI nearly as large as cell III + IV, sometimes larger; the basal cells of the perithecium distinct above it; all the cells distinguished by more or less evident constrictions. Insertion-cell nearly opaque, as are the bases of the appendages; basal cell of the outer appendage bearing a double row of close set radially disposed branches; which may be twice branched, hyaline within or deeply suffused throughout, some or all of their tips bent abruptly outward or sidewise, or strongly recurved, the curved portion tapering to a blunt point; the branches of the inner appendage similar to those of the outer; the branchlets as a whole successively longer from without inward, seldom reaching to the tip of the perithecium, the septa oblique. Perithecium $100-225 \times 20-28 \mu$. Spores about $50 \times 5 \mu$. Appendages, longest $120-140 \mu$. Receptacle to insertion-cell, longest, 265μ ; average $175 \times 35 \mu$. Total length to tip of perithecium $300-390 \mu$.

On elytra of *Diabrotica Fairmairei* Baly (Types), No. 1771, Biologia Coll., Jalapa, Mexico: of *Diabrotica* sp., No. 2471, Port of Spain, Trinidad: on legs of *Diabrotica* sp., No. 1641, Los Amates, Guatemala, (Kellerman).

This well marked species varies considerably in the dimensions of

its perithecium and receptacle. In the Mexican material the latter is comparatively short and stout, while the former is much elongated; but in the Guatemala material the reverse is the case. What appears to be an immature condition of the same species was also found on a species of *Luperodes* from Porto Velho, Amazon, collected by Mr. Mann, but none of the specimens have developed perithecia. The hooked terminations of the branches in this form are somewhat different from the ordinary type.

Laboulbenia Monocestae nov. sp.

Receptacle relatively very small and compact, the basal cell usually quite hyaline, often curved, as large as the remainder of the receptacle combined; cell II and III + IV deep contrasting translucent brown, the former very broad and short, obliquely separated from cell I as well as from cells III + IV and VI; which is obliquely placed, subtriangular, hyaline or partly suffused; cell III + IV mostly suffused, broad and short, externally prominent; cell V very small, triangular, its upper surface partly free between the base of the perithecium and the insertion-cell. Basal cells of the perithecium hyaline and contrasting, as are the lower external wall-cells of its main body; which is elongate, relatively very large, more or less curved toward the appendages, dark rich brown, hardly inflated, tapering very slightly at the broad apex; which is subtruncate or slightly rounded; the lip-edges slightly suffused. Insertion-cell thick, narrow, opaque and indistinguishable from the externally blackened basal cell of the outer appendage, which is variably developed through proliferation that takes place distally from the inner side and results in a variably developed crest-like series of from three to eight radially placed branches, each usually once, less often twice branched, externally blackened as are the outer branchlets, except distally; the lower septa all suffused; all the branchlets curved toward or past the perithecium, rather stout, slightly tapering: basal cell of the inner appendage brown, erect, longer than broad, bearing distally a pair of short branches usually consisting of a single cell terminated by a pair of antheridia. Perithecia $85-125 \times 25 \mu$. Receptacle $50-55 \times 25-30 \mu$. Appendages, longest, 175μ . Total length to tip of perithecium $140-175 \mu$.

On the legs of *Monocesta atricornis* Clk., Manaus, Amazon, (Mann) No. 2221.

A species well distinguished by its contrasting coloration, minute receptacle and large dark perithecium, which is characteristically hyaline externally at the base. The material is abundant and in good condition and does not seem to vary towards any of the varieties of *L. Homophoetae* which is its nearest ally.

***Labouribenia armata* nov. sp.**

Hyaline becoming faintly olivaceous, except the basal cell. Receptacle much smaller than the perithecium, the hyaline basal cell larger than the rest of the receptacle, from which it is separated by a horizontal septum; cell II about as large as cell III + IV, rounded, separated by symmetrical and oblique septa from cell III + IV and cell VI, which is small and somewhat oblique; cell V small, lying opposite the insertion-cell, against the base of the perithecium, the inner half of which it forms. Insertion-cell narrow, opaque and indistinguishable from the basal cells of the appendages. Basal cell of the outer appendage small, quite opaque, longer than broad; producing a terminal and a subterminal inner branch, each usually once branched; the outer branchlet of the terminal branch short, curved outward, externally blackened; the other branchlets rather long, slightly flexuous and tapering; basal cell of the inner appendage very small, rounded, prominent, hyaline, free, bearing a short branch of two or three small cells on either side. Perithecium diverging from the appendages, relatively large long and hardly inflated, wholly free; the tip well distinguished on both sides, darker; the apex paler, surmounted by an outcurved, purplish, tooth-like external or sub-lateral process, formed by one of the lip-cells; the other lip-cells hyaline, somewhat prominently rounded and subtending this process on the inner side; the blackened insertion of the trichogyne usually distinct on the left side of the purplish brown tip. Perithecium $120-125 \times 24-30 \mu$; the horn-like process about $12-14 \mu$ long. Receptacle $70-80 \times 25 \mu$. Appendages, longest, $175-210 \mu$. Total length to tip of perithecium $175-210 \mu$.

On the elytra of *Oedionychus sublineatus* Jac., No. 1772. (Biologia Coll.) Teapa, Mexico.

The appendages of this species are fundamentally similar in the origin and arrangement of their branches to those of *L. Homophoetae*, but the form is otherwise quite peculiar.

Laboulbenia Homophoetae (Speg.).

Laboulbeniella Homophoetae Speg. Cont. al Est. d. l. Laboulbeniomyctas Argentinas, p. 191.

The material of this species studied by Spegazzini appears to have been in very bad condition; but although it is not possible to form an accurate idea of the appendages from the figures given, there can, I think, be little doubt that the forms which I have assembled under this name are correctly referred. The species is the commonest one which is found on Chrysomelidae, with the possible exception of *L. Bruchii*, and inhabits a considerable variety of hosts on which it is subject to many variations. In all cases the basal cell of the outer appendage proliferates one to several times distally from the inner side, producing a variable number of branches which are almost invariably once branched above their basal cells in a characteristic fashion, and which are very variably developed as to length, number, curvature etc. The size, development, and color of the receptacle and perithecium also vary very greatly; but viewing the series of variations as a whole, I have been unable to discover sufficient grounds for even varietal separation, and have concluded to assemble all the forms having this type of appendage under a single name, although I have separated one type, *L. cristatella*, which appears to be sufficiently constant, and in which the branches of the outer appendage are always simple. Although the position of growth in this last mentioned form does not appear to affect the character of individuals, it produces a marked effect in the case of most of the variations of *L. Homophoetae*, in which individuals growing on the under surface of the host are usually characterized by a distinctly more luxuriant development, especially of the appendages, the branches of which are apt to be more numerous, longer, and stouter than in individuals which are found on the elytra, although the longest individuals seen, measuring 500 μ to the tip of the perithecium were taken from the extremities of the elytra. This is especially marked in the very abundant material obtained from *Systema 5-littera*. Individuals from this host growing on the inferior surface, develop a fan-like series of stout incurved branches; while on the elytra a nondescript type is found, with scanty slender and irregularly curved branches; and the same is true to a somewhat less marked degree in individuals obtained from corresponding positions on species of *Homophoeta*, although the forms on these hosts present minor differences. Of all

the variations which have been examined that which occurs on *Asphaera nobilitata* in Trinidad is the most striking, and would undoubtedly be referred to a distinct species were there not variations which occur on other species of the genus which approach so closely to the type form that even a varietal separation seems undesirable. This Trinidad form is very large, and grows either on the elytra or at the base of the anterior legs of its host, its color is paler than that of individuals from other species of *Asphaera*. The perithecium is distinguished by an often well developed neck-like base formed from the lower tier of wall-cells, and is usually bent abruptly outward from the appendages. The latter are very stout and long. Larger specimens have the following measurements: perithecia $225 \times 35 \mu$; appendages 480μ ; receptacle $280 \times 40 \mu$; total length to tip of perithecium 400μ . In this and several other forms the cells, of the receptacle, especially, contain a distinctly yellow or orange protoplasm, the color of which is apparently due to the peculiar yellow juices which fill the bodies of many of the Chrysomelidae.

The hosts on which forms referable to *L. Homophoetae* have been found are as follows:

(a) *Homophoeta* sp., No. 2475b and *H. aequinoctialis* Linn., No. 2475, Port of Spain, Trinidad: on *H. 6-gutta* a Say, No. 1791, Brazil;

(b) *Systema* sp., No. 1640, Los Amates, Guatemala (Kellerman); on *S. basalis* Jac., Nos. 2489 and 2490, Hayti (Mann): on *S. 5-littera* Linn.; Nos. 2469 and 2470, Port of Spain, Trinidad; No. 2479, Suriname (Rorer); No. 1769, Teapa, Mexico (Biologia Coll.).

(c) *Psylliodes* sp., No. A+, Jamaica (Brues).

(d) *Disonycha* sp. No. 1843, Guatemala (Kellerman); on *D. recticollis* Jac., No. 1769, Costa Rica (Biologia Coll.) and No. 1642, Guatemala (Kellerman). A dark form with numerous short rather slender curved appendages hardly ever reaching to the tip of the perithecium, their inner margins conspicuously indented at the septa.

(e) *Oedionychus sublineata* Jac., Teapa, Mexico, No. 1772, (Biologia Coll.). A paler form, straight, with few straight appendages, the largest specimen measuring 500μ to the tip of the perithecium.

(f) *Monocesta atricornis* Clk., No. 2221, Manaos, Amazon, (Mann). A small dark form with few very long scanty appendages, the receptacle small, the perithecium bent abruptly against the appendages which may reach 425μ in length, although the total length to the tip of the perithecium is only about 120μ .

(g) *Lactica scutellaris* Oliv., No. 1754, Balaclava, Jamaica, W. I. A form similar to that on (f) but with straight perithecium.

(h) *Asphaera nobilitata* Fab., No. 2472, Port of Spain, Trinidad; *A. transversofasciata* Jac., Bugaba, Mexico, (Biologia Coll.), No. 1773; *A. elegantissima* Schf., No. 2218, Rio Madero, Amazon (Mann); *A. Siebersii* Ill., No. 2211, Para, Brazil (Mann).

Laboulbenia cristatella nov. sp.

Hyaline, becoming suffused with olivaceous brown. Receptacle small; cell I larger than cell II, which is somewhat roundish, its margins more or less convex; cells III + IV much smaller than cell II; cell V small and narrow, often partly free above; cell VI small, flattened, and oblique. Insertion-cell narrow, opaque, indistinguishable from the basal cell of the outer appendage. Basal cell of the outer appendage black below and externally, broad and quite hyaline above, bearing externally and distally a series of branches radially placed; the outer (lowest) branch furcate, its basal cell obliquely hyaline within, externally black, the two branchlets broadly blackened externally, except distally, the outer wholly so at the base; the remaining branches always simple, stout, usually tapering somewhat toward the base and apex, broadly blackened externally, except distally; usually curved toward and beyond the perithecium, forming a crest-like series which exceeds the latter in length: basal cell of the inner appendage very small, brown, bearing a short simple branch on either side both two-celled, the lower cell deeply suffused, the upper hyaline, separated from it by a dark septum and bearing usually a pair of relatively large long antheridia, sometimes only one. Perithecium not quite free, straight, becoming dark olive brown, very slightly inflated; the tip broad, well distinguished, blackened distally, especially on the inner side; the apex with broad, rounded, rather prominent lip-cells slightly oblique inward; the outer hyaline, the inner deeply blackened, except the narrowly hyaline papillate prominent edge. Perithecia $60-76 \times 18-22 \mu$. Receptacle $50-64 \times 22-28 \mu$. Appendages longest 125μ . Total length to tip of perithecium $100-140 \mu$.

On inferior surface of *Haltica scutellata* Oliv. No. 2473, Port of Spain, Trinidad (Type). On *Asphaera Siebersii* Ill. No., 2233, Para, Brazil, (Mann). On elytra of *Lactica nigriceps* Boh., Para, Brazil, (Mann).

The above description is drawn from the Trinidad material, which is abundant and in good condition. The material from Brazil is in

both instances somewhat smaller, the branches of the appendages mostly shorter, hardly reaching to the tip of the perithecium and usually swollen, rather than tapering at the tip. The species is very closely allied to *L. Homophoetae* from which it is distinguished by the simple branches of its outer appendage, by its small size and other minor differences. It may prove however, to be merely a variety of *L. Homophoetae*.

Laboulbenia funebris nov. sp.

Dull olivaceous, becoming deeply tinged with brown. Perithecium somewhat less than one half free, becoming almost opaque, except for a hyaline area on the inner side just below the deeply blackened extremity; the lip-cells hyaline about the pore, turned somewhat outward; the outer more prominent, rounded, tipped by minute papillae; the outer margin directly continuous with that of the receptacle, hardly convex, bent inward abruptly at the tip; the inner straight or slightly convex. Receptacle symmetrically broader from below upward; the basal cell hyaline below, subtriangular; the subbasal cell somewhat longer, separated from cells III + IV and VI, which is relatively large, by somewhat oblique septa; cell III + IV rather large, cell V very minute, translucent, all the upper portion of the receptacle deeply suffused, the cell-boundaries becoming hardly distinguishable, and concolorous with the perithecium. Insertion-cell broad and thick, wholly and deeply suffused; the appendage consisting of a single outer, simple, yellowish olive, rather stout tapering, but slightly divergent outer branch of six or eight cells, relatively stout; the basal cell of the inner appendage bearing two shorter, smaller, simple branches, of usually not more than three or four cells, the subbasal bearing distally a single antheridium. Perithecium $75-80 \times 25 \mu$. Spores $45 \times 5 \mu$. Appendage, longest $140-150 \mu$. Total length to tip of perithecium $125-160 \mu$, greatest width 35μ .

On the elytra of species of *Haltica*. Mus. Comp. Zool. No. 1790, (no locality); No. 1841, Guatemala, (Kellerman).

In general appearance this ordinary looking form is not unlike the smaller specimen of *L. rigida* figured in my first Monograph the appendages being very similar. It also resembles some forms of *L. vulgaris* and of *L. polyphaga* but cells III and IV are always replaced by a single cell.

CERAIOMYCES.

More than a dozen species of this type are now available for comparison and an examination of them indicates that the genus is so closely allied to *Laboulbenia* that it may possibly have to be united with it eventually; although for the present, at least, it seems more convenient to retain the name. The cell spoken of in the original description as the "stalk-cell of the appendage," which corresponds to cells III to V in *Laboulbenia*, is, in some of the species, closely united to the perithecium, as in the West Indian forms described below; and it is therefore necessary to modify the original diagnosis based on two species in which this cell was quite free. Since the type may be regarded as corresponding to a reduced form of *Laboulbenia*, it has seemed best to refer to this cell as "cell III" of the receptacle; it being understood, however, as has been formerly pointed out, that not only this cell, but the three corresponding cells in *Laboulbenia* above alluded to, belong strictly to the appendage. The latter, in the species described below, is, for the most part, greatly reduced; its cells becoming more or less obliterated, the antheridia alone being distinctly visible. In some young individuals, however, the fundamental structure is very like that of the most simple types in *Laboulbenia*; there being outer and inner cells which give rise to corresponding sets of branches, both of which always bear antheridia. It may be mentioned further that all of the following species are characterized by possessing a normal foot, and in no instance penetrate the host by means of a haustorium.

Ceraimyces Epitricis nov. sp.

Basal and subbasal cells of the receptacle subequal, nearly hyaline, the former slightly suffused with brown just above the foot, the two together not quite as long as the perithecium; cell III clearly defined several times as long as broad, of nearly the same diameter throughout, concolorous with the perithecium. Appendage consisting of a small basal cell obliquely inserted on a dark basal septum, and bearing on the inner side two large antheridia subtended by minute cells; and externally a single antheridium, less often two, subtended by a larger cell; the antheridia becoming slightly suffused with brown. Perithecium three fifths or more free above the insertion of the appendage, translucent brown, except the small clearly defined flattened stalk-cell;

the basal cells very small, but clearly defined; the lower third united to cell III; the inner margin above it vertical, straight as far as the insertion of the trichogyne, above which the tip bends inward more or less distinctly; the outer margin abruptly bent opposite the insertion of the appendage, forming a considerable angle, so that the body appears to be bent inward; the portion of the margin above this angle running straight to the hardly distinguished tip; the somewhat compressed hyaline apex subtended externally by a distinct rounded hyaline prominence; the pore terminal; the lip-cells not prominent. Perithecium $80-90 \times 32 \mu$. Basal and subbasal cells of receptacle $50-70 \times 16 \mu$. Appendage, including antheridia, $30-32 \mu$. Cell III, $28 \times 7 \mu$. Total length to tip of perithecium $140-160 \mu$.

On elytra of *Epitrix convexa* Jac., No. 2462, Port of Spain, Trinidad.

In general form this species most nearly resembles *C. Chaetocnema* from which it is easily separated by the form of the perithecium and the peculiar external prominence which subtends its apex.

***Ceraiomycetes obesus* nov. sp.**

Cells I and II faintly brownish, distinguished by a constriction; the former more than twice as large as the latter, its lower half narrowed to the foot; cell III concolorous with the perithecium, united to it throughout, and extending nearly to its middle. Appendage arising from an oblique insertion, marked by a dark septum, hyaline, consisting of two or three very small hardly distinguishable cells bearing usually two inner and one outer antheridium. Perithecium somewhat more than half free above the insertion of the appendage, arising obliquely and externally from cell II, which it almost conceals when not viewed laterally, its outline almost symmetrically long-oval: uniform rich translucent brown, tapering to the rather broad, blunt, slightly oblique apex; the hyaline lip-edges bearing each a minute but distinct papilla, and subtended by darker shades. Perithecium $106-112 \times 52-60 \mu$. Appendage including antheridia 18μ . Receptacle, cells I-II, $52 \times 18 \mu$; cell III, $36 \times 10 \mu$. Total length to tip of perithecium $140-160 \mu$.

Near base of anterior legs of *Epitrix convexa* Jac., Port of Spain, Trinidad, No. 2464.

This species is distinguished by its relatively very large, nearly symmetrically oval perithecium, the axis of which is at a considerable angle to that of the receptacle, when viewed laterally.

***Ceraiomycetes minisculus* nov. sp.**

External margin, from tip of foot to apex, almost an arc of a circle, the corresponding opposite margin almost straight except for the slight protrusion of cell III. Basal cell of the receptacle triangular, about as broad as long, yellowish; the subbasal cell flattened distally, oblique below the base of the perithecium with which it is concolorous and from which it is hardly distinguishable; cell III longer than the portion of the receptacle below it, very narrow and hardly distinguishable from the body of the perithecium. Cells of the appendage minute, only one being distinguishable, and bearing two relatively large brownish antheridia, the outer spinose externally below its neck. Perithecium somewhat less than half free above the insertion of the appendage, relatively large, stout, very deep brown, barely translucent, the apex blunt, the hyaline lip-edges subtended by blackish shades. Perithecium $70 \times 26 \mu$. Cells I-II, 18μ long by 21μ broad; cell III, $30-32 \times 4 \mu$. Appendage, including antheridia, 22μ . Total length to tip of perithecium $90-95 \mu$.

On antennae of *Chaetocnema nana* Jac., No. 1755, Balaclava, Jamaica, W. I.

This minute species is most nearly related to *C. obsesus* from which it differs in the structure of its receptacle, and the form and position of its perithecium. The appendage is so reduced that little remains beside the antheridia.

***Ceraiomycetes dislocatus* nov. sp.**

Cells I and II nearly hyaline or becoming faintly yellowish, the former about five times as long as it is broad, abruptly enlarged above the small pointed foot, distally bent abruptly inward; the septum separating it from cell II thus more or less oblique and sublateral, marking a constriction, and giving to this part of the receptacle a more or less distinctly geniculate habit; cell II roughly isodiametric, bulging slightly externally, small, separated obliquely from the base of the perithecium; cell III relatively broad and distinct, concolorous with the perithecium. Appendage seated on a dark, somewhat oblique septum, hyaline; its two or three cells very small and indistinguishable at maturity; bearing two inner and one or rarely two outer slender faintly brownish antheridia. Perithecium more than half free above the insertion of the appendage, deeply suffused with

blackish brown, darker below the apex, the outer margin broken by a slight basal, a median and a subterminal rounded elevation; the latter, together with a corresponding elevation on the inner side, rather clearly distinguishing the tip which is bent distinctly toward the appendage; the anterior (inner) and left lip-cells more prominent, somewhat displaced by a slight twist, separated by furrows, terminating in minute flattish hyaline papillae; the other two lip-cells shorter and rounded, so that the apex is asymmetrical. Perithecium $80-90 \times 35 \mu$. Cell I $50-85 \times 15 \mu$; cell II about $17 \times 18 \mu$; cell III $24-28 \times 7 \mu$. Appendage, to tips of antheridia, about 25μ . Total length to tip of perithecium $125-175 \mu$.

On the mid-inferior surface of the abdomen of *Chaetocnema minuta* Mels., No. 2460; Port of Spain, Trinidad.

A species very clearly distinguished by its geniculate receptacle, and distinctive perithecium.

Ceraiomycetes Trinidadensis nov. sp.

Cells I and II hyaline; the former abruptly bent, more than twice as long as the subtriangular subbasal cell which is obliquely separated from the base of the perithecium and from cell III; which is clearly defined, concolorous with the perithecium, bulging slightly below the nearly horizontal, relatively broad insertion of the appendage. Appendage relatively large, the two cells of the outer branch hyaline, distinct, subequal, bearing usually two large antheridia which equal them in length. Perithecium translucent, blackish olive-brown, rather narrow, nearly symmetrical in outline, its upper half, or somewhat less, free above the insertion of the appendage; tapering distally to the broad subhyaline extremity, which is rounded and slightly sulcate and but slightly asymmetrical; the stalk- and basal cells hardly distinguishable. Perithecium $80-88 \times 28 \mu$. Cell I, $28-35 \times 18 \mu$; cell II, 18μ ; cell III, $28 \times 10 \mu$. Appendage, including antheridia, 35μ . Total length to tip of perithecium about 125μ .

On the legs of *Epitrix convexa* Jac.; No. 2459, Port of Spain, Trinidad.

Though this species is not distinguished by any single striking peculiarity, it differs distinctly from any of the others by the form of its perithecium which ends in a broad blunt hyaline apex. It is most nearly related to *C. Chaetocnema*, a larger more slender form.

Ceraimyces Chaetocnema nov. sp.

Straight or but slightly curved, relatively long and slender. Cells I and II hyaline, becoming tinged with pale reddish yellow; cell I often somewhat elongate, usually somewhat more than twice as long as the subbasal cell, from which it is separated by a nearly horizontal septum; cell III concolorous with the perithecium, well distinguished. Insertion of the appendage somewhat oblique, blackened, the latter bearing two inner antheridia and one outer, the necks of which are subtended by a conspicuous spine. Perithecium slightly less than two thirds free above the insertion of the appendage; becoming dark blackish olivaceous; the stalk- and basal cells hardly distinguishable, rather long and narrow, tapering distally; the tip becoming distinguished by slight subtending elevations; the lips tending to turn slightly outward, two of them bearing minute flattened papillae which project above the otherwise rather bluntly rounded, slightly sulcate apex. Perithecium $90-116 \times 38-42 \mu$. Spore $52 \times 4 \mu$. Cells I-II, $60-122 \times 22-25 \mu$. Cell III, $38-42 \times 8-10 \mu$. Appendage 30μ . Total length to tip of perithecium $160-250 \mu$.

On the elytra of *Chaetocnema* sp., No. 2248, Amazon, Mann. on *C. minuta* Mels. No. 2460, 2461, Port of Spain, Trinidad: on *Epitrix lucidula* Har., No. 2457, and *E. convexa* Jac., No. 2458, Port of Spain.

Although varying considerably in size, this species is much larger than any of the others which occur on Chrysomelidae, with the exception of *C. Nisotrae*. It appears to be quite rare and usually not more than one or two individuals are found together on a single host. A form apparently not separable from this species was also found in Port of Spain on a single individual of *Scolochrus* sp.

Ceraimyces Nisotrae nov. sp.

Comparatively large, short and stout. Receptacle dirty brownish yellow throughout, obscurely punctate above the basal cell, which is short and abruptly bent, its upper half abruptly twice as broad; cell II hardly longer than broad and but slightly larger than the stalk-cell (cell VI of *Laboulbenia*), which lies just above it; cell III hardly extending above the perithecial cavity, and lying opposite the stalk- and basal cells, which are clearly defined and, like it, dirty yellowish brown. Insertion of the appendage slightly oblique, its basal cell almost wholly suffused with dark brown; basal cell of the outer branch

usually bearing two branchlets, one two-, the other one-celled, each terminated by a very long slender antheridium; the inner branch single as a rule, consisting of a rather elongate cell terminated by an antheridium; the antheridia seated on blackened septa, below which a brown suffusion extends downward. Perithecium relatively large, distally somewhat broader; free except its basal and stalk-cells, deeply suffused with dark brown, faintly translucent; the external margin straight, or usually slightly concave; the inner convex and curved inward abruptly to form the tip, which is usually twisted somewhat less than one quarter; so that the outer lip, which is modified to form a brown, rounded projection, subtended on either side by curved ear-like processes, is usually almost lateral in position; the rest of the apex almost symmetrically rounded, somewhat inflated, sub-hyaline, contrasting with the basal portion of the tip which is concolorous with the body of the perithecium. Perithecium $100-125 \times 35-40 \mu$. Spores $40 \times 4 \mu$. Cells I-II about $50 \times 22-24 \mu$. Cell III, $24-28 \times 8-10 \mu$. Total length to tip of perithecium, average 175μ , longest 200μ .

Appressed along a ridge parallel to the outer margin, usually of the left elytron, of *Nisotra* sp., No. 2481, Kamerun, West Africa (Schwab): on *N. Chapuisi* Jac., Madagascar, M. C. Z., No. 2504.

The differences which separate this species from all other forms are so great that they need hardly be pointed out, the peculiar outgrowths of the lip-cells being in themselves sufficient to distinguish it. The Madagascar material, although inhabiting a smaller and very different species of the host-genus, corresponds in all essentials with specimens from Kamerun.

